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tutions unhampered by public or private control.

Respectfully submitted,
(Signed) ROBERT H. THURSTON,
VICTOR C. ALDERSON,
THOMAS GRAY,
J. B. JOHNSON.

A NATIONAL UNIVERSITY.*

To the National Council of Education:

The undersigned members of the committee to investigate the entire subject of a national university and to report to the Council do now report, as follows:

The appointment of the committee was authorized by the Council at their meeting at Washington, D. C., on July 11, 1898, in the passage of the following resolution, offered by Mr. Dougherty, of Illinois:

Resolved, That the chair appoint a committee of fifteen, the majority of whom shall be members of the Council, who shall investigate the entire subject of the establishment of a national university and report to the Council.

MEMBERSHIP.

The president of the Council subsequently appointed the committee, as follows:

WILLIAM R. HARPER (*chairman*), president of the University of Chicago.

EDWIN A. ALDERMAN, president of the University of North Carolina (now president of Tulane University of Louisiana).

JAMES B. ANGELL, president of the University of Michigan.

NICHOLAS MURRAY BUTLER, professor of philosophy and education in Columbia University.

JAMES H. CANFIELD, president of Ohio State University (now librarian of Columbia University).

J. L. M. CURRY, agent of the Peabody and Slater educational funds.

NEWTON C. DOUGHERTY, superintendent of schools, Peoria, Ill.

ANDREW S. DRAPER, president of the University of Illinois.

CHARLES W. ELIOT, president of Harvard University.

EDMUND J. JAMES, professor of public administration in the University of Chicago.

*Report of the Committee of the National Educational Association.

WILLIAM H. MAXWELL, superintendent of schools, New York, N. Y.

BERNARD J. MOSES, professor of history and political economy in the University of California.

J. G. SCHURMAN, president of Cornell University.

F. LOUIS SOLDAN, superintendent of schools, St. Louis, Mo.

WILLIAM L. WILSON, president of Washington and Lee University.

MEETINGS.

The committee have held three protracted meetings: at Washington, D. C., on November 2, 3 and 4, 1899; at Chicago, Ill., on February 26, 27 and 28, 1900; and at New York, N. Y., on May 23 and 24, 1901. The first meeting of the committee was attended by all the members except Messrs. Angell, James (absent in Europe), and Moses. The second meeting was attended by Messrs. Harper, Alderman, Butler, Dougherty, Draper, Eliot and Soldan. The third meeting was attended by Messrs. Harper, Butler, Canfield, Dougherty, Draper, Eliot and Maxwell.

Mr. Moses has been absent from the country on public business, and so has been prevented from sharing in any of the deliberations of the committee. Mr. Wilson's untimely death in 1900 deprived the committee of the benefit of his cooperation in the preparation of this report.

PRELIMINARY INQUIRIES.

Before the committee came together for the first time, individual members had, at the request of the chairman, undertaken to prepare reports upon special phases of the subject referred to the committee, with a view to preparing the way for their more intelligent consideration and discussion. The reports so prepared included one by Mr. James, on the constitutionality of a national university (printed in the *Educational Review*, Vol. XVIII., pp. 451-66, December, 1899); one by Mr. Canfield, on past efforts to establish a national university and the reasons for their failure; two

by Mr. Butler, on bills to establish a national university pending before the Congress, and on the history of any funds and bequests toward the establishment of a national university, respectively; one by Mr. Harper, on the steps taken by the Association of Agricultural Colleges and Experiment Stations to secure provision for further study in the government departments at Washington by graduates of those institutions; two by Mr. Eliot, on the existing educational agencies at Washington which might be affected by any scheme for a national university, and on the number, variety, extent and character of the scientific or technical departments of governmental work which might properly be included in any scheme for a national university, respectively; one by Mr. Angell, on the probable attitude of the principal universities of the country toward the project to establish a national university; and one by Mr. Maxwell, on existing organizations which are interested in the establishment of a national university.

QUESTIONS STATED.

With the information contained in these reports before them, the committee proceeded to the consideration of the following questions:

1. Should there be established a statutory university of the United States?

2. (*a*) If the first question be answered in the affirmative, how should such university be established and governed, and what should be its scope and functions?

(*b*) If the first question be answered in the negative, should the Congress be asked to place the educational facilities of the government departments at the disposal of a non-governmental institution?

3. If the question 2 (*b*) be answered in the affirmative, should a plan be devised by which, through the cooperation of several institutions, such a non-governmental in-

stitution might be established and maintained at Washington, this to involve its incorporation and governmental aid?

ARGUMENT FOR A NATIONAL UNIVERSITY.

In considering the first question, the committee took into careful consideration the argument advanced in favor of a statutory university of the United States, which is usually presented in the following form:

1. Such a university is needed to complete and to crown the educational system of the United States.

2. Such a university is needed to supplement the resources of existing institutions and to offer opportunities for more advanced investigation and research than are now offered by the universities of the country.

3. Such a university was urged by Washington, and has been urged by many eminent statesmen since the foundation of the government, as desirable and necessary.

4. Such a university is needed in order to coordinate the scientific work now being carried on in the several government departments at Washington, and to put that work at the disposal of advanced and adequately trained students.

CRITICISM OF THIS ARGUMENT.

Waiving all questions of the constitutional power of the Congress to provide for a university of the United States, which power is held by Mr. James, in the report above referred to, to be fully established, the fourfold argument in favor of a national university suggests the following considerations and comments:

1. There is no educational system of the United States in the formal and legal sense in which there is an educational system of each of the several States, and therefore the contention that there should be a national university to serve the nation, as each of the State universities serves its

State and the State educational system, rests upon a false analogy. In a general and popular sense there is undoubtedly an American educational system, but it consists of institutions of three different types:

A. Those which the State establishes and maintains, such as the public schools and the state universities.

B. Those which the State authorizes, such as school and university corporations, private or semi-public in character, which gain their powers and privileges by charter, and which are often exempt in whole or in part from taxation.

C. Those which the State permits, such as private-venture (unincorporated) educational undertakings of various kinds.

Each of these classes is in a true sense national, in that it reflects and represents in part the way which the American people have followed in providing general education. No inventory of the nation's educational activity is complete that does not include them all. There are in existence at the present time a group of truly national universities, some of them of the State-authorized and some of the State-supported type, and in them the national ideals and the national temper are as truly revealed and realized as are those of Germany in Berlin and in Leipzig, those of England in Oxford and in Cambridge, and those of France in Paris and in Montpellier. The argument for a statutory national university based upon the hypothesis that there is now no national university in existence is only formally true; in fact, it is without foundation.

2. The argument that a statutory national university is needed to supplement the resources of existing institutions is based upon a misunderstanding of the facts. No one of the world's universities can possibly be supreme in all departments of intellectual activity; a statutory university of the United States could not be so.

Conditions of time, place, special equipment and of individual scholarship all tend to make one university stronger in some one field of investigation than in others and to render it as unwise as it is impracticable for any one university to set before itself the hope of excelling in every branch of scholarship. The universities of the United States now offer ample opportunities for the most advanced research, and these opportunities in many departments are far in excess of the number of students wishing to avail of them. On the other hand, a university which should aim to hold mature and highly trained men indefinitely in the stage of learning without either producing or teaching would be a positive injury to the national life and character. The period of preparation for the active duties of life is already unduly prolonged.

3. An examination of the several passages in the speeches and writings of Washington that relate to a national university discloses the facts that the evil against which he wished a national university to guard has long since ceased to be possible, and that his plans and hopes have been realized with a completeness of which he never dreamed by the universities which have grown up in the United States. Washington's fear was that the youth of America, being forced to obtain their higher education in Europe, would not 'escape the danger of contracting principles unfavorable to republican government.' Obviously this fear has been utterly dispelled, and the universities that exist are far more complete and far more advanced than anything that could have been foreseen a century ago. There appears, therefore, to be no force in this phase of the argument for a statutory university at Washington.

4. That there are important opportunities for research of various kinds in connection with the government laboratories and collections at Washington is certain, and that

full advantage should be taken of these opportunities is greatly to be desired. This desire is confessed by the Congress itself in the joint resolution of April 12, 1892, to be referred to more fully hereafter, and is frequently expressed by the directors of the scientific work of the government. But it by no means follows that the only way, or indeed the best way, to make use of these opportunities is through the creation of a statutory, degree-conferring university. The objections to such an institution far outweigh any possible advantages which might follow from its establishment for the sole purpose of making fully effective the existing opportunities for higher instruction and research in connection with the government service, especially as it is possible to make these opportunities fully effective in what is in our judgment a simpler and a better way.

DECLARATION OF THE COMMITTEE.

The committee, therefore, by unanimous vote—twelve members being present and voting—adopted the following declaration on November 3, 1899:

1. *It has been and is one of the recognized functions of the federal government to encourage and aid, but not to control, the educational instrumentalities of the country.*

2. *No one of the bills heretofore brought before Congress to provide for the incorporation of a national university at Washington commends itself to the judgment of this committee as a practicable measure.*

3. *The government is not called upon to maintain at the capital a university in the ordinary sense of the term.*

ALTERNATIVE PLANS.

In this declaration the committee answered in the negative the first question under consideration, namely: Should there be established a statutory university of the United States?

The second question before the committee

was: Should the Congress be asked to place the educational facilities of the government departments at the disposal of a non-governmental institution?

It appears from the public record that the Congress has already done this. There are two expressions of the will and the purpose of the Congress in this matter.

The first is contained in the joint resolution, approved April 12, 1892, which is as follows:

Joint resolution to encourage the establishment and endowment of institutions of learning at the national capital by defining the policy of the government with reference to the use of its literary and scientific collections by students:

WHEREAS, Large collections illustrative of the various arts and sciences, and facilitating literary and scientific research, have been accumulated by the action of Congress through a series of years at the national capital; and

WHEREAS, It was the original purpose of the government thereby to promote research and the diffusion of knowledge, and is now the settled policy and present practice of those charged with the care of these collections specially to encourage students who devote their time to the investigation and study of any branch of knowledge by allowing to them all proper use thereof; and

WHEREAS, It is represented that the enumeration of these facilities and the formal statement of this policy will encourage the establishment and endowment of institutions of learning at the seat of government, and promote the work of education by attracting students to avail themselves of the advantages aforesaid under the direction of competent instructors; therefore,

Resolved by the Senate and House of Representatives of the United States of America, in Congress assembled, That the facilities for research and illustration in the following and any other governmental collections now existing or hereafter to be established in the city of Washington for the promotion of knowledge shall be accessible, under such rules and restrictions as the officers in charge of each collection may prescribe, subject to such authority as is now or may hereafter be permitted by law, to the scientific investigators and to students of any institution of higher education now incorporated or hereafter to be incorporated under the laws of Congress or of the District of Columbia, to wit:

One. Of the Library of Congress.

Two. Of the National Museum.

- Three. Of the Patent Office.
 - Four. Of the Bureau of Education.
 - Five. Of the Bureau of Ethnology.
 - Six. Of the Army Medical Museum.
 - Seven. Of the Department of Agriculture.
 - Eight. Of the Fish Commission.
 - Nine. Of the Botanic Gardens.
 - Ten. Of the Coast and Geodetic Survey.
 - Eleven. Of the Geological Survey.
 - Twelve. Of the Naval Observatory.
- Approved, April 12, 1892.

The second is contained in the following paragraph in the general deficiency appropriation bill passed at the second session of the Fifty-sixth Congress, and approved March 3, 1901:

That facilities for study and research in the government departments, the Library of Congress, the National Museum, the Zoological Park, the Bureau of Ethnology, the Fish Commission, the Botanic Gardens, and similar institutions hereafter established shall be afforded to scientific investigators and to duly qualified individuals, students and graduates of institutions of learning in the several states and territories, as well as in the District of Columbia, under such rules and restrictions as the heads of the departments and bureaus mentioned may prescribe.

The joint resolution of April 12, 1892, placed the governmental facilities for research at the disposal of duly qualified students of institutions of learning at Washington, D. C. The law of March 3, 1901, extends the same privilege to duly qualified students or graduates of institutions of learning wherever they may be situated throughout the United States.

It appears, therefore, that the Congress has already taken the necessary steps to make possible all that is desired in this connection, and it only remains to devise a plan by which the advanced students who wish to avail of the opportunities offered may be given such systematic information, direction and oversight as they may need in order to carry on their studies to the best advantage, and in order that such official records of their work at Washington may be kept as will justify the several uni-

versities of the country in recognizing the period spent in study and investigation at Washington in passing upon their qualifications as candidates for the higher academic degrees.

A NON-GOVERNMENTAL INSTITUTION AT WASHINGTON.

The remaining question before the committee for consideration was, then, this: Should a plan be devised by which, through the cooperation of several institutions, such a non-governmental institution should be established and maintained at Washington, this to involve its incorporation and governmental aid.

The subject of the best form of organization for such an institution and of its precise relations to the government has been given prolonged consideration. Advice and suggestion have been sought from the heads of the several scientific bureaus at Washington, from the representatives of the Association of Agricultural Colleges and Experiment Stations, from the presidents of the State universities and land-grant colleges, and from many others believed or supposed to be interested in the question. It seemed at first as if a solution might be found through the Smithsonian Institution, and that it might most wisely undertake the advisory and supervisory functions for which provision was to be made. The authorities of the Smithsonian Institution, however, did not view the suggestion with favor, and, in addition, they were doubtful of their legal capacity to perform such functions. Another objection was found in the fact that the Smithsonian Institution restricts itself to the field of the natural sciences, whereas students of history, political economy, and philology are also to be provided for.

An alternative suggestion was that the Bureau of Education should be asked to assume executive control of the proposed

student body. On reflection, however, it appeared that this would require far-reaching amendments to the law governing the bureau, that these might be difficult or impossible to obtain, and that the matter might become complicated with wholly extraneous considerations relating to the status of the Bureau of Education and the extension of its authority in other directions.

It has, therefore, seemed best to the committee not to propose either of the plans above mentioned.

The committee have been advised, however, of a plan for a non-governmental institution at Washington, which may be able to supply all that is desired. This plan is the outcome of action taken by the Washington Academy of Sciences and by the George Washington Memorial Association.

WASHINGTON ACADEMY OF SCIENCES.

The Washington Academy of Sciences includes in its membership all, or nearly all, the directors and officers of the scientific bureaus of the government. It was organized in 1898 and grew out of the affiliation which had previously existed between the local scientific societies. It is an incorporated body having for its main object to bring within a single organization the representatives of the varied scientific work being carried on at the capital. The academy has power to acquire and to hold real estate, to publish, to conduct or to assist investigation in any department of science, to maintain a library, and in general to transact any business pertinent to an academy of sciences. The list of members, resident and non-resident, of the Washington Academy of Sciences shows that it is national in its scope and influence, and that representatives of philosophy, history, education and political economy are included.

GEORGE WASHINGTON MEMORIAL ASSOCIATION.

The George Washington Memorial Association is an organization of women, incorporated in the District of Columbia in 1898, "to advance and secure the establishment in the city of Washington, D. C., of a university, for the purposes, and with the objects, substantially as contemplated and set forth in, and by, the last will of George Washington, the first President of the United States of America, and to increase the opportunities for the higher education of the youth of the said United States, and to this end to collect, take and hold moneys, gifts and endowments, to take and to hold by purchase, donations, or devise, real estate, to erect and furnish buildings to be used by said university, when legally established," and so forth.

In the year 1901 the certificate of incorporation of the George Washington Memorial Association was amended in due legal form, and all mention of a university was omitted from the statement of its purposes. The object of the Association is now declared to be "to aid in securing in the city of Washington, D. C., the increase of opportunities for higher education, as recommended by George Washington, the first President of the United States of America, in his various messages to Congress, notably in the first, in favor of 'the promotion of science and literature,' and substantially as contemplated and set forth in the last will of George Washington, and by and through such other plans and methods as may be necessary and suitable for the objects and purposes herein set forth, and to this end to collect, take and hold moneys, gifts and endowments, to take by purchase, donation, or devise, real estate, and hold the same, to erect and furnish buildings to be used for the purposes herein set forth, and, when necessary for the said purposes, to sell, convey, mortgage and exchange any real and personal estate which the As-

sociation may hold, and to do any and all things which may lawfully be done in carrying out the objects and purposes of this corporation."

ACTION OF THESE ORGANIZATIONS.

It appears that action has been taken by these organizations—by the Board of Managers of the former on February 26, 1901, and by the Board of Trustees of the latter on March 13, 1901—which brings the support of each to a plan for an institution of the type which has been discussed above. Both organizations have agreed to cooperate to found an institution in the city of Washington, as a memorial to George Washington, which shall be maintained to promote the advanced study of the sciences and the liberal arts, and which shall assist in carrying out the purposes and the intent of the joint resolution of April 12, 1892, and of the law of March 3, 1901.

WASHINGTON MEMORIAL INSTITUTION.

On May 17, 1901, articles of incorporation were filed at Washington, D. C., signed by Daniel C. Gilman, president of the Johns Hopkins University; Charlotte Everett Hopkins, president of the George Washington Memorial Association; C. Hart Merriam, chief of the United States Biological Survey; George M. Sternberg, surgeon-general, United States army; Charles D. Wolcott, director of the United States Geological Survey; and Carroll D. Wright, United States Commissioner of Labor, as follows:

ARTICLES OF INCORPORATION.

WE, the undersigned, persons of full age, and citizens of the United States, and a majority of whom are citizens of the District of Columbia, being desirous to establish and maintain, in the city of Washington, an institution in memory of George Washington for promoting science and literature, do hereby associate ourselves as a body corporate, for said purpose, under the general incorporation acts of the Congress of the United States enacted for the District of Columbia; and we do hereby certify in pursuance of said acts as follows:

1. The name or title by which such institution shall

be known in law is the Washington Memorial Institution.

2. The term for which said institution is organized is nine hundred and ninety-nine years.

3. The particular business and objects of the institution are: to create a memorial to George Washington; to promote science and literature; to provide opportunities and facilities for higher learning; and to facilitate the utilization of the scientific and other resources of the government for purposes of research and higher education.

4. The number of its trustees for the first year of its existence shall be fifteen.

Steps are to be taken at once by these incorporators to organize the institution, as described, and to select a body of trustees which shall be efficient and, so far as may be, representative of a variety of scientific and educational interests.

CHARACTERISTICS OF THE INSTITUTION PROPOSED.

Concerning the proposed institution, we assume:

1. That it will be independent of government support or control, as it will also be independent of the support or control of existing educational institutions. It might well appeal with peculiar force to the generosity of those men and women who are willing to increase, and who are desirous of increasing, the endowment of higher education in the United States.

2. That its objects will be:

a. To facilitate the use of the scientific and other resources of the government for research.

b. To cooperate with universities, colleges and individuals in securing to properly qualified persons opportunities for advanced study and research now obtainable only to a limited extent in Washington and not at all elsewhere.

3. That its oversight and control will be in the hands of trustees and officers representing the educational experience and ideals of the existing institutions for higher education.

4. That the arrangements between the student body and the several governmental bureaus will be made, subject to the by-laws of the trustees, in such a way as to carry out to the fullest possible extent the declared policy of the Congress. It is expected that the government officials will advise rather than instruct the students assigned to them.

5. That the sole test of admission to the privileges which the institution offers will be merit and proficiency, to be ascertained in such way as the trustees shall provide.

6. That students coming from universities and colleges for a period of study or investigation at Washington will, upon request, be given appropriate credentials, on completing their work, for presentation to the institution from which they seek a degree.

7. That students working in government laboratories or collections will be subject to the rules and regulations there prevailing.

PROVISION FOR STUDENTS.

	Possible in- structors.	Maxi- mum No. of students.
1. Animal industry	10	25
2. Anthropology and ethnology...	4	13
3. Astronomy	3	8
4. Botany	11	25
5. Cartography	2	5
6. Chemistry	6	10
7. Forestry.....	10	20
8. Geology	10	17
9. History (Library of Congress)..	5	10
10. History and diplomacy (State Department)	1	5
11. Hydrography	5	10
12. Library administration and methods (Library of Con- gress).....	5	15
13. Magnetism	1	2
14. Meteorology	5	15
15. Mineral resources.....	2	5
16. Paleontology	5	7
17. Physics	2	3
18. Standards (Bureau of).....	Now being org'd	
19. Statistics.....	2	5
20. Tides	1	2
21. Topography.....	10	20
22. Zoology	34	50
	134	272

8. That, if successfully carried out, this plan will provide a body of trained students, ready for expert work, many of whom might enter the government service, while others would become instructors in institutions of learning or be engaged as experts in a private capacity.

The departments or subjects in which graduate students could be received and the provision that could be made for them at present are unofficially estimated to be as in previous table.

ACTION OF COMMITTEE.

The committee have adopted the following resolution :

Resolved, That we approve the plan for a non-governmental institution, known as the Washington Memorial Institution, to be established and maintained at Washington, D. C., for the purposes of promoting the study of science and the liberal arts at the national capital, and of exercising systematic oversight of the advanced study and investigation to be carried on by duly qualified students in the governmental laboratories and collections, in accordance with the terms of the joint resolution of Congress approved April 12, 1892, and those of the act of March 3, 1901.

We recommend that the National Council of Education adopt the following resolution :

Resolved, That the report of the committee authorized by resolution of July 11, 1898, to investigate the entire subject of a national university be received, and the committee discharged.

WILLIAM R. HARPER,
Chairman.

EDWIN A. ALDERMAN.
NICHOLAS MURRAY BUTLER.
JAMES H. CANFIELD.
J. L. M. CURRY.
NEWTON C. DOUGHERTY.

ANDREW S. DRAPER.
CHARLES W. ELIOT.
WILLIAM H. MAXWELL.
J. G. SCHURMAN.
F. LOUIS SOLDAN.

NOTE.—Mr. E. J. James was unable to attend the meetings of the Committee and declines to sign the report.

May 24, 1901.

RADIO-ACTIVE SUBSTANCES AND THEIR RADIATIONS.

DURING the past five years many physicists, attracted by the freshness of the field and the promise of important discoveries, have turned their attention to the study of the newly discovered radio-active substances. The result has been a rapid increase in knowledge of and interest in the phenomena, until now the main facts are known to all scientists, but, since the knowledge of the subject is increasing so fast, a short review is now and then acceptable and necessary, especially to those whose chief interests lie along other lines. In this article an attempt is made to point out the more interesting features of the subject.

The real discovery of the persistent radiations from the uranium compounds was made by M. Henri Becquerel in 1896. It had been stated by M. Niewenglowski that under the action of sunlight certain phosphorescent salts emit radiations which can penetrate black paper. In testing whether this applies to uranium salts, M. Becquerel discovered to his surprise that with uranium salts exposure to sunlight is unnecessary; uranium compounds are all the time giving off radiations which can pass through opaque bodies and affect a photographic plate on the other side. It was soon found that the uranium radiations discharge electrified bodies in the neighborhood by ionizing the surrounding air after the manner of kathode and X-rays. Naturally, about

the first hypothesis was that the radiations are ether vibrations, perhaps of very short wave-length, and many attempts were made to find evidence of reflection, refraction or polarization, with the result that none of these properties nor any of the properties peculiar to wave motion has yet been shown to belong to these radiations.

A few months after the discovery of the uranium radiations Professor Schmidt and Mme. Curie, a Polish physicist working in Paris, independently discovered the radio-activity of thorium compounds. An elaborate study of thorium radiations has since been made at McGill University by Professors Rutherford and Owens.

A greater discovery, however, was in store for Mme. Curie; for observing that many specimens of pitchblende, the principal ore of uranium, were more strongly radio-active than the pure uranium salts, she and her husband attempted a chemical separation of the suspected more active element. The result is well known; they succeeded in isolating two substances having at least 100,000 times the radio-activity of uranium. The first of these substances, which they named polonium, follows the bismuth in the separation from pitchblende. The separation from the bismuth is effected by taking advantage of the fact that polonium sulphide is more volatile than bismuth sulphide. The second substance they named radium. It follows the barium in its chemical reactions, but its chloride is less soluble in water than barium chloride, which affords a means of separation from the barium. Another very active substance has been obtained from pitchblende by M. Debierne. He has named it actinium. Chemically it is closely allied to titanium.

No one of these three substances has been obtained free from impurity, and the amounts obtained are exceedingly small, only a few centigrams from a thousand kilograms of pitchblende.